Nov 13th, 4:00 PM - 5:00 PM

The Fate of Sulfur During Melting and Crystallization: Implications for Sulfur Transfer from Mantle to the Crust-Atmosphere System

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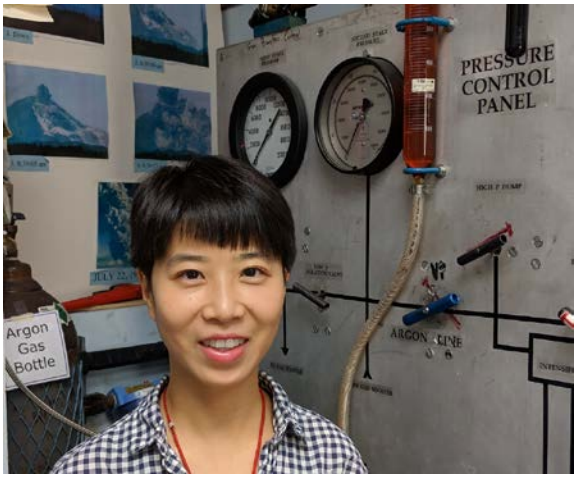
The Doctoral Program in Environmental Management and MSU Sustainability Seminar Series Present:

The fate of sulfur during melting and crystallization: Implications for sulfur transfer from mantle to the crust-atmosphere system.

WHEN: November 13, 4:00 pm WHERE: CELS 120 lecture hall

Shuo Ding

Earth and Environmental Sciences, Queens College (CUNY)



Shuo Ding earned her B.Sc. in Geology from Chinese University of Geosciences (Beijing) in 2010 and completed her Ph.D. in geochemistry and experimental petrology at Rice University in 2016. She was a postdoctoral fellow in American Museum of Natural History (AMNH) from 2016 to 2018, and now she is a postdoctoral researcher in Queens College, CUNY. Ding is also an affiliated research associate in AMNH. Ding's research investigates the geochemistry of volatiles (sulfur, carbon, water, halogens) in the magmatic processes on Earth, Mars and the Moon.

Sulfur (S) is one of the most abundant volatiles; one that has a fundamental impact on various magmatic processes, from the mantle to the Earth's surface. Ocean island basalts (OIB) are one of the critical probes for understanding the chemical, lithological and thermal variations in the Earth's mantle. Therefore, S abundances of primary OIB that sample peridotite partial melts, as well as deeply recycled components, can provide a better understanding of the long-term S cycle on Earth. In this study, we developed a model to describe the behavior of sulfide and copper (Cu) during decompression melting of the mantle by combining experimental constraints on mantle melting and empirical models of sulfur content at sulfide saturation (SCSS). Our calculation shows that the total S inventory of the heterogeneous mantle source of OIBs is higher than that of mid ocean ridge basalts (MORB) due to the presence of subducted eclogites and sediments, which might play an important role in retaining sulfide in the Earth's shallow mantle. The release of sulfur to the atmosphere during volcanic eruptions can perturb climate on a local-global scale and cause significant environmental impact by forming acid rains. In a case study, we look at the behavior of sulfur during the 2006 eruption of Augustine volcano, Alaska by combining the geochemistry of melt inclusions and modeling of S behavior during crystallization of the pre-eruption stage. Our analysis shows that pre-eruptive vapor and the precipitation of S-bearing minerals have played critical roles in controlling S release during intermediate-silicic volcanic eruptions.

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